

Hexazinone

HERBICIDE FACT SHEET

U.S. DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

This fact sheet is one of a series issued by the Bonneville Power Administration for their workers and the general public. It provides information on forest and land management uses, environmental and human health effects, and safety precautions. A list of definitions is included in Section VIII of this fact sheet.

I. BASIC INFORMATION

COMMON NAME: hexazinone

CHEMICAL NAME: [3-cyclohexyl-6-(dimethylamino)-1-methyl-S-triazine-2,4-(1H,3H)-dione]

Cas No. 51235-04-2

CHEMICAL TYPE: triazine-dione herbicide

PESTICIDE CLASSIFICATION: herbicide

REGISTERED USE STATUS: General Use Pesticide. Restricted Use Pesticide in Washington.

FORMULATIONS: Commercial herbicide products generally contain one or more ingredients. An inert ingredient is anything added to the product other than an active ingredient. Because of concern for human health and the environment, EPA announced its policy on toxic inert ingredients in the Federal Register on April 22, 1987 (52FR13305). This policy focuses on the regulation of inert ingredients. EPA's strategy for implementing this policy included the development of four lists of inerts, based on toxicological concerns. Inerts of toxicological concern were placed on List 1. Potentially toxic inerts/high priority for testing were placed on List 2. Inerts of unknown toxicity were placed on List 3, and inerts of minimal concern were placed on List 4.

The inert ingredients of the Velpar® formulation are not classified by the USEPA as inert ingredients of toxicological concerns to humans or the environment.

The contents of the hexazinone formulation are listed below:

Velpar® Herbicide (soluble powder) Hexazinone 90 % Inert 10 %	Velpar® DF (dispersible granules) Hexazinone 75 % Inert 25 %	Velpar® L (water dispersible liquid) Hexazinone 25 % Inert (45% ethanol) 75 %
Velpar® ULW (soluble granules) Hexazinone 75 % Inert 25 %	Velpar® ULW DF (soluble granules) Hexazinone 75 % Inert 25 %	

RESIDUE ANALYTICAL METHODS: EPA Method 633.

II. HERBICIDE USES

REGISTERED FORESTRY, RANGELAND AND RIGHT-OF-WAY USES: Hexazinone as Velpar® is registered for use in agriculture and forestry for selective weed control, and in non-agricultural areas as a non-selective general weed and woody plants control herbicide. For terrestrial use only.

OPERATIONAL DETAILS:

TARGET PLANTS: Broad-spectrum annual, biennial, and perennial weeds including woody plants.

MODE OF ACTION: Hexazinone inhibits photosynthesis.

METHOD OF APPLICATION AND RATES: Broadcast and spot spray applications at 1/4 ounce to 8 ounces of formulated product per acre. Ground or aerial (helicopter only) application. Do not apply more than 8 ounces/acre/year.

SPECIAL PRECAUTIONS:

TIMING OF APPLICATION: Timing is dependent on the target plant. Application may be made at any time the ground is not frozen. As hexazinone must move to the root zone to be effective for pre-emergent control, adequate soil moisture is necessary.

DRIFT CONTROL: Care should be exercised not to overspray or apply the herbicide to adjacent non-target areas. Drift control is achieved by observing weather conditions and following label and sprayer instructions. Spray droplet size should be 150 microns or larger.

Restrictions/Warnings/Limitations: Do not apply through any type of irrigation system. Do not apply to frozen ground. Do not apply 30 to 60 days before grazing, harvest, or feeding. Non-target plants may be adversely effected from drift and run-off.

III. ENVIRONMENTAL EFFECTS/FATE

SOIL:

RESIDUAL SOIL ACTIVITY: The half-life of hexazinone is 175 days.

ADSORPTION: The K(oc) of hexazinone is 40.

PERSISTENCE AND AGENTS OF DEGRADATION: Hexazinone is persistent and is known to leach into groundwater. Hexazinone is degraded by soil microorganisms and sunlight.

METABOLITES/DEGRADATION PRODUCTS AND POTENTIAL ENVIRONMENTAL EFFECTS: Hexazinone degrades to carbon dioxide; many degradates have similar or identical characteristics to the parent material.

WATER:

SOLUBILITY: 33,000 mg/l in water (pH 7).

POTENTIAL FOR LEACHING INTO SURFACE AND GROUND WATER: Hexazinone is persistent and is known to leach into groundwater under favorable soil conditions and high water tables.

AIR:

VOLATILIZATION: 0.03 Pa at 25° C.

POTENTIAL FOR BYPRODUCTS FROM BURNING OF TREATED VEGETATION: None.

IV. ECOLOGICAL TOXICITY EFFECTS ON NON-TARGET SPECIES

MICROORGANISMS:

ACUTE CONTACT TOXICITY: LD₅₀ (honey bee contact) >100 µg/bee

OVERALL TOXICITY: **Practically Non-Toxic**

PLANTS: Contact will injure or kill target and non-target plants.

AQUATIC VERTEBRATES:

ACUTE TOXICITY: LC₅₀ (rainbow trout 96-hour) >320 mg/l

ACUTE TOXICITY: LC₅₀ (bluegill sunfish 96-hour) >370 mg/l

OVERALL TOXICITY: **Practically Non-Toxic**

AQUATIC FRESHWATER INVERTEBRATES:

ACUTE TOXICITY: LC₅₀ (*Daphnia magna* 48-hour) 151.6 mg/l

OVERALL TOXICITY: **Practically Non-Toxic**

AQUATIC ESTUARINE/MARINE INVERTEBRATES:

ACUTE TOXICITY: EC₅₀ (Eastern oyster larvae 48-hour) >320 mg/l

ACUTE TOXICITY: LC₅₀ (grass shrimp 96-hour) >78 mg/l

OVERALL TOXICITY: **Slightly Toxic**

TERRESTRIAL ANIMALS:

AVIAN ACUTE ORAL TOXICITY: LD₅₀ (bobwhite quail) >2251 mg/kg

AVIAN ACUTE ORAL TOXICITY: LD₅₀ (mallard duck) >2251 mg/kg

AVIAN SUBACUTE DIETARY TOXICITY: LC₅₀ (bobwhite quail) >5000 mg/kg

AVIAN SUBACUTE DIETARY TOXICITY: LC₅₀ (mallard duck) >10,000 mg/kg

MAMMAL ACUTE ORAL TOXICITY: LD₅₀ (rat) >1100 mg/kg

OVERALL TOXICITY: **Slightly Toxic**

BIOACCUMULATION POTENTIAL: **Slight Potential**

THREATENED AND ENDANGERED SPECIES: Federally listed terrestrial and aquatic plants may be adversely affected if the product is applied directly to the plants, or indirectly as the result of drift or leaching.

V. TOXICOLOGICAL DATA

ACUTE TOXICITY:

ACUTE ORAL TOXICITY: LD₅₀ (rat) >1200 mg/kg

ACUTE DERMAL TOXICITY: LD₅₀ (rabbit) >5278 mg/kg

PRIMARY SKIN IRRITATION: Rabbit - Slight Irritant

PRIMARY EYE IRRITATION: Rabbit – Severe Irritant

ACUTE INHALATION: LC₅₀ (rat) >3.94 mg/l

OVERALL TOXICITY: Category I – Danger

CHRONIC TOXICITY:

CARCINOGENICITY: Classified as a Group D chemical: Not classifiable as a human carcinogen.

DEVELOPMENTAL/REPRODUCTIVE: Some effects at mid- to high dose levels.

MUTAGENICITY: Positive in one study and negative in another. Suggests slight to no mutagenic effects.

HAZARD: The end-use product label for Velpar® carries the *Danger* signal word due to irreversible eye damage.

VI. HUMAN HEALTH EFFECTS

ACUTE TOXICITY (POISONING):

REPORTED EFFECTS: Hexazinone formulations will cause irreversible eye damage.

CHRONIC TOXICITY:

REPORTED EFFECTS: Decreased body weight, decreased food consumption, increased white blood cells, decreased liver weight and increased relative brain weights were observed in test animals..

POTENTIAL FOR ADVERSE HEALTH EFFECTS FROM CONTACTING OR CONSUMING TREATED VEGETATION, WATER OR ANIMALS: EPA reports no toxicological endpoints of concern.

POTENTIAL FOR ADVERSE HEALTH EFFECTS FROM INERT INGREDIENTS CONTAINED IN THE FORMULATED PRODUCTS: None reported.

HEALTH EFFECTS OF EXPOSURE TO FORMULATED PRODUCTS: Severe eye irritation.

HEALTH EFFECTS ASSOCIATED WITH CONTAMINANTS: None reported.

HEALTH EFFECTS ASSOCIATED WITH OTHER FORMULATIONS: None reported.

VII. SAFETY PRECAUTIONS

SIGNAL WORD AND DEFINITION:

HEXAZINONE - **DANGER** – CORROSIVE, CAUSES IRREVERSIBLE EYE DAMAGE

PROTECTIVE PRECAUTIONS FOR WORKERS: Applicators and other handlers must wear long-sleeved shirt and long pants, shoes plus socks, and protective eyewear.

MEDICAL TREATMENT PROCEDURES (ANTIDOTES):

EYES: Flush eyes with water for 15 minutes and call physician.

SKIN: Wash all exposed areas with soap and water; call physician if irritation persists.

INGESTION: Do not induce vomiting. Promptly drink a large quantity of milk, egg whites, gelatin solution, or if these are not available, drink large quantities of water. Avoid alcohol. Call a physician.

INHALATION: Remove to fresh air.

HANDLING, STORAGE AND DISPOSAL: Store at room temperature or cooler. Do not reuse container. Rinse container and dispose accordingly.

EMERGENCY SPILL PROCEDURES AND HAZARDS: Contain and sweep up material of small spills and dispose as waste. Do not contaminate water, food, or feed by storage or disposal.

VIII. DEFINITIONS

adsorption – the process of attaching to a surface

avian – of, or related to, birds

CAEPA – California Environmental Protection Agency

carcinogenicity – ability to cause cancer

CHEMTREC – Chemical Transportation Emergency Center

dermal – of, or related to, the skin

EC₅₀ - median effective concentration during a bioassay

ecotoxicological – related to the effects of environmental toxicants on populations of organisms originating, being produced, growing or living naturally in a particular region or environment

FIFRA – Federal Insecticide, Fungicide and Rodenticide Act

formulation – the form in which the pesticide is supplied by the manufacturer for use

half-life – the time required for half the amount of a substance to be reduced by natural processes

herbicide – a substance used to destroy plants or to slow down their growth

Hg – chemical symbol for mercury

IARC – International Agency for Research on Cancer

K(oc) – the tendency of a chemical to be adsorbed by soil, expressed as: $K(oc) = \text{conc. adsorbed}/\text{conc. dissolved}/\% \text{ organic carbon in soil}$

LC₅₀ – the concentration in air, water, or food that will kill approximately 50% of the subjects

LD₅₀ – the dose that will kill approximately 50% of the subjects

leach – to dissolve out by the action of water

mg/kg – weight ratio expressed as milligrams per kilogram

mg/l – weight-to-liquid ratio expressed as milligrams per liter

microorganisms – living things too small to be seen without a microscope

mPa – milli-Pascal (unit of pressure)

mutagenicity – ability to cause genetic changes

NFPA – National Fire Protection Association

NIOSH - National Institute for Occupational Safety and Health

NOEL - no observable effect level

non-target – animals or plants other than the ones that the pesticide is intended to kill or control

OSHA - Occupational Safety and Health Administration

Pa – Pascal (unit of pressure)

persistence – tendency of a pesticide to remain to remain in the environment after it is applied

pesticides – substances including herbicides, insecticides, rodenticides, fumigants, repellents, growth regulators, etc., regulated under FIFRA

PPE – personal protective equipment

ppm – weight ratio expressed as parts per million

residual activity – the remaining amount of activity as a pesticide

T&E – Threatened and Endangered Species (from the Endangered Species Act)

µg – micrograms

volatility – the tendency to become a vapor at standard temperatures and pressures

IX. INFORMATION SOURCES

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X. TOXICITY CATEGORY TABLES

TABLE I: HUMAN HAZARDS

Category	Signal Word	Route of Administration			Hazard	
		Acute Oral LD ₅₀ (mg/kg)	Acute Dermal LD ₅₀ (mg/kg)	Acute Inhalation LC ₅₀ (mg/l)	Eye irritation	Skin irritation
I (Highly Toxic)	DANGER (poison)	0-50	0-200	0-0.2	corrosive: corneal opacity not reversible within 7 days	corrosive
II (Moderately Toxic)	WARNING	>50-500	>200-2000	>0.2-2	corneal opacity reversible within 7 days; irritation persisting for 7 days	severe irritation at 72 hours
III (Slightly Toxic)	CAUTION	>500-5000	>2000-20,000	>2-20	no corneal opacity; irritation reversible within 7 days	Moderate irritation at 72 hours
IV (Practically Non-toxic)	NONE	>5000	>20,000	>20	no irritation	Moderate irritation at 72 hours

After *Pesticide User's Guide*, Ohio State University, Extension Bull. No. 745, 1998.

TABLE II: ECOTOXICOLOGICAL RISKS TO WILDLIFE (TERRESTRIAL AND AQUATIC)

Risk Category	Mammals	Avian	Avian	Fish or Aquatic Invertebrates
	Acute Oral LD ₅₀ (mg/kg)	Acute Oral LD ₅₀ (mg/kg)	Acute Dietary LC ₅₀ (mg/kg)	Acute Concentration LC ₅₀ (mg/l)
Very Highly Toxic	<10	<10	<50	<0.1
Highly Toxic	10-50	10-50	50-500	0.1 – 1
Moderately Toxic	51-500	51-500	501-1,000	>1 – 10
Slightly Toxic	501-2,000	501-2,000	1,001-5,000	>10 – 100
Practically Non-toxic	>2,000	>2,000	>5,000	>100

Table II created from information contained in *Pesticides and Wildlife*, Whitford, Fred, et al., Purdue University Cooperative Extension Service PPP-30, 1998.

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